Next Generation Advanced Binder Chemistries for High Performance, Environmentally DurableThermal Control Material Systems, Phase II

Completed Technology Project (2004 - 2006)

Project Introduction

This innovative SBIR Phase II proposal will develop next generation products for Thermal Control Material Systems (TCMS) an adhesives based on the next generation nano-cluster chemistry based new binder systems, through the systematic investigations to tailor required unique performance properties with reliability and durability. The efforts address a critical need of NASA which plans to undertake challenging exploration missions in high radiation orbits for high power thermal management. This Phase II product development and validation is mainly proposed to fulfill the issues related to the material obsolescence and the technology gap, and to present next generation product concepts from the new class of binder material chemistries that are dielectrically engineered with required secondary emission properties. Thus, this timely proposal can fulfill the need of the multifunctional binder based products that have a required thermal shock, thermal cycling performance and potential to improve the affordability. The proposed efforts will generate needed validation data to generate the confidence in the developed products and will carry out needed optimization of the proposed products. It will also provide needed input to Phase III opportunities to the mission officials from JIMO, ISS and to the various officials of DoD and NRO on the issues, where the next generation materials can make a significant difference.

Anticipated Benefits

Potential NASA Commercial Applications: The DoD, NRO and commercial industry are planning several satellites for the broad band communication activities. The FAA and NASA are also envisioning commercial space based radars for air traffic control. Such platform structures are expected to be, if not as large as ISS, but at least sizable - where the charge accumulation can be an over riding concerns. These planned candidate fleet designs of such integrated space systems may require putting assets in the mid-earth orbits for over all optimization and minimization of mission costs. Such mission and fleet designs can be possible only if the material technologies are made available that have the needed space environment stability built into them for the required reliability and durability along with the charge dissipation abilities. Currently no material technology exists that can mitigate high energy electron and proton induced degradation effects. Many other NASA exploration, planetary, commercial and DoD platform hardware will also benefit form these TCMS and Zero CVCM adhesives products proposed for development in Phase II. The concepts for products like: adhesives and DSR can benefit the NRO's hardening and robustness initiative significantly. The cost effective dividend provided by the charge mitigation applications of the binder chemistry by either dip coating or the rub priming of the binder systems can also have major appeal to Non-NASA applications.

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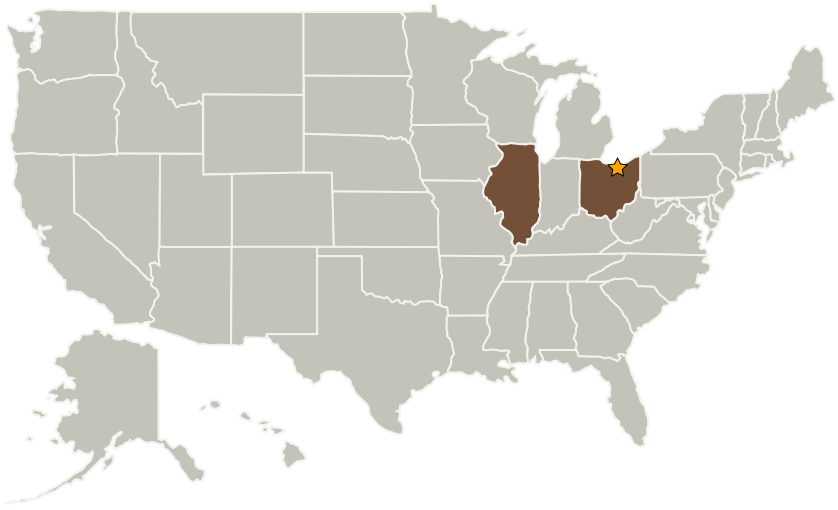
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Applied Material Systems Engineering, Inc. (AMSENG)	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Schaumburg, Illinois

Primary U.S. Work Locations	
Illinois	Ohio

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mukund S Deshpande

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.3 Internetworking
    - TX05.3.4 Integrated Network Management